EPA Region V

CORRESPONDENCE/MEMORANDUM

State of Wisconsin

DATE: July 6, 1994

FILE CODE: 4530
FID #: 436 036 700
Rec'd: 6/27/94
witnessed: Y (JC)

55 071 00053

TO: FILES

FROM: Andy Seeber - AM/7

SUBJECT: Review of Stack Test Performed at Red Arrow Products, Manitowoc

I. SOURCE

Red Arrow Products
1226 S. Water St.
Manitowoc, WI 54221
Permit: 85-IRS-043A, Issued 6/17/91
Stack/Process: S01, P01 (sawdust dryer)

Particulates = Method 5 + backhalf

Test Date: 6/1/94
Test Firm: Badger Labs.
1110 S. Oneida St.
Appleton, WI 54915
Crew Chief: Mr. Bruce Lamers (414) 739-9213

Process Description: Red Arrow tested their Heil SD-22 rotary drum sawdust dryer. The dried sawdust and exhaust gases are separated in a cyclone prior to the Fisher-Klosterman collector.

III. SUMMARY OF RESULTS

TABLE 1

Limits	Emission	Compliance
0.20 #/10^3#	0.17	Y
10.00 #/hr	8.45	Y
*10.04 #/hr	8.45	Y

* process weight rate equation

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IV. DISCUSSION OF RESULTS

The results are shown in the above Table. This is a retest of the same system tested on 2/17/94 indicating noncompliance. The permit limitation is the most restrictive of the those listed in Table 1. The most restrictive limitation is the 0.20 $\#/10^3\#$ limit. Process P01 is in compliance with the particulate limitation.

cc: Jim Crawford - LMD
Joe Perez - AM/7
USEPA Region V

BADGER LABS & ENGINEERING Est. 1966
1110 S. Oneida St., Appleton, WI 54915

Location:Sawdust Dryer Test # 1 Date: 6-1-94

Static Pressure=	-0.28	Nozzle Diameter=	0.244
Barometric Pressure=	29.49	Absolute Stack Temp=	645.1
Meter h Coeff=	1.84	Absolute Meter Temp=	525.7
C Factor=	1.013	Ave sqrt delta p=	1.16043
Dry Gas Meter Volume=	60.220	Stack, dia.=	24
Water Collected=	187	Stack Area=	3.142
Absolute Stack Pressure=	29.47	Pitot tube Coeff=	0.84
Absolute Meter Pressure=	29.73	Particulates =	467
Percent Oxygen=	18.4	Total Sampling Time=	60
Percent Carbon Dioxide=	2.0	Nozzle Area=	0.00032
Percent Nitrogen & CO=	79.6	Time=	12:50-13:55

Volume of Sample at Standard Conditions, Dry Basis

Vmstd= 60.885 cubic feet

Volume of Water Vapor in Sample at Standard Conditions.

Vwstd= 8.802 cubic feet

Proportion of Water Vapor in Gas Stream

Bwo= 0.126

Concentration of Particulate Matter, Dry Basis

C's= 0.1181 gr/dscf

Cs= 1.691e-05 lb/dscf

Dry Molecular Weight of Stack Gas

Md= 29.056

Molecular Weight of Stack Gas, Wet Basis

Ms= 27.660

Stack Gas Velocity

Vs= 74.134

Volumetric Flow Rate, Dry Basis, Standard Conditions

Qs= 590541 dscfh

Emission Rate

E.R.= 9.99 lb/hr.

Percent of Isokinetic Sampling

I= 99.8

BADGER LABS & ENGINEERING Est. 1966
1110 S. Oneida St., Appleton, WI 54915

Location: Sawdust Dryer Test # 2 Date: 6-1-94

Static Pressure=	-0.33	Nozzle Diameter=	0.244
Barometric Pressure=	29.49	Absolute Stack Temp=	636.7
Meter h Coeff=	1.84	Absolute Meter Temp=	528.0
C Factor=	1.013	Ave sqrt delta p=	1.17759
Dry Gas Meter Volume=	60.959	Stack, dia.=	24
Water Collected=	141	Stack Area=	3.142
Absolute Stack Pressure=	29.47	Pitot tube Coeff=	0.84
Absolute Meter Pressure=	29.74	Particulates =	312.2
Percent Oxygen=	19.2	Total Sampling Time=	60
Percent Carbon Dioxide=	1.4	Nozzle Area=	0.00032
Percent Nitrogen & CO=	79.4	Time=	14:31-16:11

Volume of Sample at Standard Conditions, Dry Basis

Vmstd= 61.376 cubic feet

Volume of Water Vapor in Sample at Standard Conditions.

Vwstd= 6.637 cubic feet

Proportion of Water Vapor in Gas Stream

Bwo= 0.098

Concentration of Particulate Matter, Dry Basis

C's= 0.0783 gr/dscf

Cs= 1.122e-05 lb/dscf

Dry Molecular Weight of Stack Gas

Md= 28.992

Molecular Weight of Stack Gas, Wet Basis

Ms= 27.919

Stack Gas Velocity

Vs= 74.394

Volumetric Flow Rate, Dry Basis, Standard Conditions

Qs= 620112 dscfh

Emission Rate

E.R.= 6.96 lb/hr.

Percent of Isokinetic Sampling

I= 95.8

BADGER LABS & ENGINEERING Est. 1966
1110 S. Oneida St., Appleton, WI 54915

Location:Sawdust Dryer Test # 3 Date: 6-1-94

Static Pressure=	-0.33	Nozzle Diameter=	0.244
Barometric Pressure=	29.49	Absolute Stack Temp=	641.7
Meter h Coeff=	1.84	Absolute Meter Temp=	531.0
C Factor=	1.013	Ave sqrt delta p=	1.17109
Dry Gas Meter Volume=	61.248	Stack, dia.=	24
Water Collected=	167	Stack Area=	3.142
Absolute Stack Pressure=	29.47	Pitot tube Coeff=	0.84
Absolute Meter Pressure=	29.74	Particulates =	387.1
Percent Oxygen=	18.6	Total Sampling Time=	60
Percent Carbon Dioxide=	2.0	Nozzle Area=	0.00032
Percent Nitrogen & CO=	79.4	Time=	16:36-17:38

Volume of Sample at Standard Conditions, Dry Basis

Vmstd= 61.325 cubic feet

Volume of Water Vapor in Sample at Standard Conditions.

Vwstd= 7.861 cubic feet

Proportion of Water Vapor in Gas Stream

Bwo= 0.114

Concentration of Particulate Matter, Dry Basis

C's= 0.0972 gr/dscf

Cs= 1.392e-05 lb/dscf

Dry Molecular Weight of Stack Gas

Md= 29.064

Molecular Weight of Stack Gas, Wet Basis

Ms= 27.807

Stack Gas Velocity

Vs= 74.423

Volumetric Flow Rate, Dry Basis, Standard Conditions

Qs= 604584 dscfh

Emission Rate

E.R.= 8.41 lb/hr.

Percent of Isokinetic Sampling

I= 98.2

II. Process Description

The exhaust stack carries exhaust gases from the burner and sawdust dryer. The burner is used to generate the heat needed to dry the sawdust. The process involves the drying of hardwood sawdust in a Heil model SD-22 rotary dryer. The dried sawdust and exhaust gases are separated in a cyclone prior to the Fisher-Klosterman collector. Particulate emissions are removed by a Fisher Klosterman, Inc.; Model XQ120-26.5 cyclone collector. The pressure drop across the collector average 15.0" H_2O during the first test. The pressure drop across the collector average 14.5" H_2O during the second and third test.

The following is a summary of the Process Throughput:

Process Data

Test Run	Sawdust Dried, tons/hr.
1	5.75
2	4.92
3	5.09
ave.	5.25

III. Comments

The testing on June 1, 1994 was originally planned to simultaneously test the inlet and outlet of the cyclone. The inlet testing was requested by Red Arrow to determine efficiency of the collector. We were not able to seal off the inlet ports very effectively due to the high positive pressure (15 inches H_2O). The inlet testing was dropped because it was felt that to much air was being lost and it might affect the outlet results. Because of this and some problems encountered on the outlet test, the test was scratched and three additional tests were performed on the outlet.

During run number two there was a plug up in the dryer which shut down the system. The testing was stopped for about 40 minutes to correct the problem. No other problems were encountered that we were aware of. We feel the test results presented accurately indicate the emission rate during the test period.

414-739-9013, FAX 414/739-5399 1-800-776-7196